Rehabilitating Elderly Cardiac Patients

J. MICHAEL ANDERSON, MD, *Baltimore, Maryland*

The aging cardiovascular system undergoes many anatomic and physiologic changes. Increased vascular resistance, myocardial "stiffness," abnormalities of rhythmicity of the sinoatrial node, irregular cardiac rhythms, and alterations in heart rate and blood pressure responses are all seen more frequently in older patients. These changes are likely to impair these patients' ability to make the rapid adjustments necessary to maintain cardiac output during exercise and activity. When cardiovascular disease processes are superimposed on the "normal" concomitants of aging, greater alterations in hemodynamic response to exercise activity are noted than usually occur in younger cardiac patients.

Exercise testing of older cardiac patients is safe and is usually needed to prescribe an appropriate intensity of exercise activity. The choice of the exercise protocol, the timing of the exercise test in relation to taking prescribed cardiac medication, the choice of exercise equipment, and special considerations for devices such as pacemakers and automatic implantable cardiodefibrillators must be considered before the exercise test is done. Many of these factors and the presence of either silent or overt cardiac symptoms or untoward hemodynamic events will also affect the exercise prescription. Elderly patients usually show substantial functional improvement when participating in a cardiac rehabilitation program and comply well with prescribed exercise. Early educational intervention may be crucial to reducing disability in these patients.

(Anderson JM: Rehabilitating elderly cardiac patients, *In* Rehabilitation Medicine—Adding Life to Years [Special Issue]. West J Med 1991 May; 154:573-578)

The process of cardiac rehabilitation in elderly patients (older than 70 years) must take into account the nature of the cardiac problem, concomitant illnesses, and the physiologic response to both exercise activity and the medical management of any underlying cardiac condition. Heart diseases occurring in the elderly include specific types of valvular disease and conduction disturbances that are associated with degeneration of the connective tissues of the heart.[1] Although the heart mass remains normal or decreases somewhat in size with aging, the endocardium diffusely thickens. The thickening is associated primarily with increases in fibrosis and the amount of collagen fibers, particularly in the left ventricle and atrium. The heart valves, particularly the mitral and aortic, become more fibrotic with age and both thicken and become more rigid. Usually these morphologic changes produce no notable hemodynamic changes. In more advanced cases, substantial aortic stenosis or aortic or mitral valve insufficiency can occur, predisposing to other cardiovascular problems including cerebrovascular accidents, left atrial enlargement, and secondary atrial fibrillation. Older "normal" persons usually have a number of additional relatively minor physiologic changes that are fairly widespread. The mean heart rate decreases with age. The inherent rhythmicity of the sinoatrial node changes, and irregular cardiac rhythms develop at an increased rate with both exercise and activity.[2,3] The maximum heart rate achievable during exercise also decreases with age (Table 1).[4] Peripheral vascular resistance in elderly patients is increased, primarily due to atherosclerosis and increased rigidity of the arterial system. The systolic blood pressure usually increases more than the diastolic pressure. These opposite heart rate and blood pressure responses to exercise offset each other so that cardiac work does not reflect an age-related change. A decline in cardiac output is noted, however, primarily because of a decreased stroke volume. The cardiac index may decrease by 0.8% per year with aging, with older subjects having greater difficulty increasing their cardiac output during maximal exertion.[5] The change in left ventricular ejection fraction from resting to exercise values decreases with age and appears to be lower in older persons. Higher filling pressures are noted in the "normal" older population in association with the higher cardiac output of exercise activity. This is primarily due to "stiffness of the myocardium" associated with the structural changes already described. In addition to the degenerative heart diseases occurring specifically in elderly persons, cardiovascular dysfunction will also arise from heart diseases that have continued from a younger age (Table 2).[1]

These normal and abnormal physiologic changes in the cardiovascular system with aging frequently impair elderly patients' ability to make the rapid adjustments necessary to maintain cardiac output at all times and under all conditions. Elderly patients are more vulnerable to the development of transitory episodes of heart failure and are predisposed to syncope and falls as a result of momentary and sudden discrepancies between cardiac output and that necessary to maintain adequate cerebral flow.

These cardiovascular and hemodynamic changes are superimposed on a general reduction in physiologic function by humans. The decline in functional capacity has been estimated at 0.75% per year after age 30.[6] A decline in muscle strength and mass and basal metabolic rate, generalized "dehydration" with decreased intracellular water content, an increased amount of body fat, a decrease in respiratory function, changes of the nervous system with a decrease in the cell

From the Sinai Rehabilitation Center, Baltimore, Maryland.

Reprint requests to J. Michael Anderson, MD, Sinai Rehabilitation Center, Belvedere at Greenspring, Baltimore, MD 21215-5271.

ABBREVIATIONS USED IN TEXT

AICD = automatic implantable cardiodefibrillator
ECG = electrocardiogram

number within the central nervous system, altered peripheral nerve function with slowing of the nerve conduction velocity, and alterations in the skeletal system including reduced bone density may all contribute to the declines in work capacity and capability of doing exercise activity.

Morphologic changes also develop in cartilage, ligaments, and tendons, which decrease flexibility with advancing age.[7] Muscles show an alteration in fiber type with the development of a more homogenous composition and a disproportionate loss of fast-twitch type II fibers that results in a 50% reduction in senile muscle mass compared with normal adult muscle.[8] Changes in oxidative metabolism also become manifest in old age. All of these factors result in a decreased capability to continue specific tasks. Both the underlying substrate of these "normal" changes and other adverse changes brought about by coexisting noncardiac disease processes must be considered when developing a physical exercise and activity program for elderly cardiac patients.

The prescription of aerobic exercise activity should be preceded and followed by appropriate warm-up and cool-down exercises, each varying from 5 to 15 minutes in duration. The interposed dynamic phase of exercise needs to be individually prescribed to fit the capabilities of each patient participating in a cardiac rehabilitation program.[9-13] A low-level exercise test or submaximal test is often used to monitor safety with exercise activity and to obtain an appropriate exercise prescription. Guidelines promulgated by the American College of Sports Medicine require that exercise testing be done in all older persons with or without symptoms and with or without known cardiac disease (Table 3).[4] The frequency and duration of exercise participation is similar to that prescribed for younger patients with cardiac disease and for healthy adults (Table 4).[14] Older cardiac patients have no increased risk when performing exercise activity and have an improved attendance ratio compared with younger patients.[12] Lower training intensities are used in older cardiac patients during the exercise sessions. This is because of the reduced functional capacity noted on exercise testing. Because maximal heart rates are easier to obtain on an exercise test than are peak oxygen uptake values, they are more often used in prescribing the intensity of exercise activity.

Exercise tests for prescribing an exercise program in older cardiac patients should not be done in the standard manner. Older patients participating in a cardiac rehabilitation program already have established cardiac diagnoses, and a physician doing exercise testing is not usually trying to determine whether myocardial ischemia exists as evidenced by the presence of signs or symptoms suggestive of cardiac disease. The physician's focus is primarily on generating safe indices for the exercise prescription. This focus mandates that every effort should be made to do the test under conditions that most closely simulate the exercise activity in which a patient will be participating. There is no need to discontinue cardiac medications, as is usually done for standard exercise testing to reduce the likelihood of having false-positive or -negative tests. The patients need to continue their cardiac medications. The exercise test should be scheduled in a time frame that coincides with the proposed time for exercise so that the effects of these medications on heart rate, blood pressure, electrical potential (electrocardiogram), and symptoms will be as closely simulated as possible. Adhering to these guidelines will result in the most accurate prescription possible and reduce the likelihood of the subsequent development of complications with exercise activity that could occur if the patient were tested during a time when a medication was at a peak or trough level. Untoward hemodynamic responses to exercise, such as the occurrence of angina or other cardiovascular symptoms, may also be avoided by following this procedure.

The type of exercise activity to be prescribed for a patient should be reflected in the selection of the exercise test protocol whenever possible. Patients often have higher heart rates using an upper extremity ergometer or stationary cycle than when walking or using a treadmill. Musculoskeletal or neurovascular deficits may be more functionally limiting to patients than their cardiovascular dysfunction with certain types of activity. It is therefore advised that, whenever possible, patients be tested on the type of equipment and with the exercises they will be using. Cardiac rehabilitation personnel working with elderly patients should become familiar with and use exercise test protocols comprising a variety of exercise equipment in addition to the standard treadmill tests.

Exercise testing in a patient older than 65 years is not associated with an increased rate of medical complications.[15,16] Exercise tests during the first three to six weeks after a myocardial infarction are best done using a submaximal test.[17] After this time subjective maximal exercise testing can usually be done safely. Typically the test will reveal a low aerobic work capacity of about 3 mets.* Maximal heart rates

*A met is a unit of measurement of heat production by the body—the metabolic heat produced by a resting-sitting subject, being 50 kg-cal per m^2 of body surface per hour.

TABLE 1.—*Maximum Heart Rate Predicted by Age and Conditioning**

Maximum Heart Rate, %	*Age, yr*														
	20	*25*	*30*	*35*	*40*	*45*	*50*	*55*	*60*	*65*	*70*	*75*	*80*	*85*	*90*
Unconditioned															
100	197	195	193	191	189	187	184	182	180	178	176	174	172	170	168
90	177	175	173	172	170	168	166	164	162	160	158	157	155	153	151
75	148	146	144	143	142	140	138	137	135	134	132	131	129	128	126
60	118	117	115	114	113	112	110	109	108	107	106	104	103	102	101
Conditioned															
100	190	188	186	184	182	180	177	175	173	171	169	167	165	163	161
90	171	169	167	166	164	162	159	158	156	154	152	150	149	147	145
75	143	141	140	138	137	135	133	131	130	128	127	125	124	122	121
60	114	113	112	110	109	108	106	105	104	103	101	100	99	98	97

*From American College of Sports Medicine.[4(p170)]

TABLE 2.—*Heart Diseases in Old Age**

Heart diseases from younger age
- Congenital
- Hypertensive
- Ischemic
- Rheumatic valvular disease
- Syphilitic aortic regurgitation
- Mitral regurgitation
  - Papillary muscle dysfunction
  - Ruptured chordae tendineae (due to endocarditis)
- Cor pulmonale
- Conduction disturbance (inflammatory, ischemic)

Heart diseases specific for aged
- Mitral regurgitation
  - Ring calcification
  - Ring dilatation
  - Ruptured chordae tendineae (due to degeneration)
  - Nodular sclerosis
- Calcified aortic stenosis
- Degenerative aortic regurgitation
- Conduction disturbance (chronic)

*From Sugiura et al.1(p535)

are notably reduced below that predicted for age. Frequently there is also a reduced increase in the rate-pressure product comparing rest with maximal exercise values.

In addition to obtaining appropriate measurements for exercise prescription, the exercise test is also helpful in stratifying risk.[18] In particular, those patients older than 70 in whom ventricular arrhythmias develop during the exercise test have a substantial reduction in life expectancy as compared with the nonarrhythmia group.[19]

Most elderly patients with a cardiac disorder will be using one or more medications. Frequently these drugs will have an effect on the cardiovascular indices both at rest and with exercise activity. The reduction in heart rate, both at rest and during exercise, is related to the amount of β-blocking medication used. Although the heart rate is lower in persons using these medications, the maximal oxygen consumption and rate-perceived exertion do not appear significantly affected.[20] Therefore, the method used to calculate the exercise prescription using the heart rate response is not changed because the patient is taking a β-blocker.

The concurrent use of both heart rate response and rate-perceived exertion is helpful for monitoring exercise activity in elderly patients.[21] This is particularly the case when medication dosages or medications are changed. During the period of medication adjustment, patients can continue to exercise to their assigned rating of perceived exertion, rather than to the previously established target heart rate. Once the new dosage of medication has been equilibrated, the typical heart rate achieved at the prescribed rating of perceived exertion can usually serve as the "new" target heart rate. This method of adjusting target heart rates often precludes the necessity of repeating an exercise test. The target heart rate so determined can be corroborated at the next regularly scheduled exercise test done to establish the accuracy of the prescription and to monitor continued progress in improved functional capacity according to the protocols established by the cardiac rehabilitation program.

Some elderly patients will have limited exercise capabilities because angina occurs before they reach maximal functional capacity. For them, the target heart rate should be established at 5 to 10 beats per minute below the angina threshold.[22] Patients with angina will show substantial functional improvement because the angina threshold is raised as the result of a reduced heart rate-pressure product at each level of submaximal exercise.[23,24] The use of intermediate- or long-acting oral nitrates may also be helpful in elderly cardiac patients with angina. When taken before initiating exercise activity, the resulting vasodilatory effects on both the general vasculature and the coronary arteries may allow them to exercise at a higher level. Nitrates should be used with caution in the elderly, however, because of the associated risk of hypotension and syncope with an increased risk of falling. When adding oral nitrates to an exercise program, patients should be monitored more intensely with an increased frequency of blood pressure and pulse determinations and continuous electrocardiographic (ECG) monitoring. This ensures that no untoward hemodynamic or ECG problems occur at the higher level of exercises and that the medications are being well tolerated. Despite these concerns with the use of nitrates, the medications can be effective in elderly patients who have a low tolerance to exercise activity because of the early occurrence of angina. This strategy has allowed elderly cardiac patients to participate in an exercise program with a subsequent improvement in function that has translated into improved performance with their usual daily activities.

Older patients found to have silent myocardial ischemia with significant ST segment depression should similarly be provided with a target heart rate response of 5 to 10 beats lower than the "threshold level" at which ST segment depression was noted.

Some elderly patients with cardiomyopathy may also benefit from a cardiac rehabilitation program. These patients should be exercised at a substantially lower intensity, with the initial prescription being 60% to 65% of that safely achieved on a graded exercise test. Studies are not available comparing outcomes in these patients, but anecdotal reports and experience show that these patients do achieve benefit with increased functional capacity resulting from their participation in a cardiac rehabilitation program.

Elderly patients who have had pacemakers inserted also show notable improvement in work capacity after participat-

TABLE 3.—*Guidelines for Exercise Testing in Persons With Known Cardiovascular, Pulmonary, or Metabolic Disease**

	Patients' Age, yr					
	Apparently Healthy		*Higher Risk*			*With Disease*
				≥35		
Recommendation	*<45*	*≥45*	*<35 No Symptoms*	*No Symptoms*	*Symptoms*	*Any Age*
Maximal exercise test before an exercise program	No	Yes	No	Yes	Yes	Yes
Physician attend for maximal testing	No (< 35)	Yes	Yes	Yes	Yes	Yes
Physician attend for submaximal testing	No	No	No	Yes	Yes	Yes

*From American College of Sports Medicine.4(p7)

TABLE 4.—*Guidelines for Exercise Prescription for Healthy Adults and Cardiac Patients**

Population	*Exercise Variables*			
	Frequency	*Intensity Level*	*Duration, min*	*Mode*
Healthy adult	3 to 5 x/wk	60% to 80% $\dot{V}o_2$	15 to 60	Aerobic activities, weights, games
Cardiac patients				
Angina	3 to 5 x/wk	70% to 85% anginal threshold	15 to 60	Walk, jog, bike
MI or CABG				
Phase I	2 to 3 x/d	HR rest, 20/min	5 to 20	Range of motion, ambulation stairs
Phase II	3 to 4 x/d	HR rest, 20/min, or 50% to 70% $\dot{V}o_2$	15 to 60 30 to 60	Range of motion, walk Range of motion, walk, bike, arm ergometry
Phase III	3 to 4 x/wk	50% to 80% $\dot{V}o_2$	30 to 60	Range of motion, walk, jog, bike, swim, games, weights
PTCA	†	†	†	†
Transplants (outpatients)	3 to 4 x/wk	RPE, 12 to 14/min	15 to 60	Range of motion, walk, bike, arm ergometry
Fixed-HR pacemaker	3 to 4 x/wk	Systolic blood pressure, 60 to 80 mm of mercury	15 to 60	Walk, jog, bike, swim, games

CABG = coronary artery bypass graft (procedure), HR = heart rate, MI = myocardial infarction, PTCA = percutaneous transluminal coronary angioplasty, RPE = rate-perceived exertion, $\dot{V}o_2$ = maximal oxygen consumption

*From Ward et al.[14(p204)]
†The same as for patients with Phase III MI or CABG.

ing in a cardiac rehabilitation program as compared with their functional capacity before the insertion of a pacemaker.[25] Recent advances in pacemaker construction allow for faster rate responses with exercise, with a smoother, more physiologic transition toward the upper rate limits of the devices.[26] Because of the improved surgical techniques and the advances in pacemaker technology, implanting pacemakers in the elderly has become relatively simple[27] and has resulted in less reluctance to do so. Patients with a ventricular demand pacemaker increased their cardiac output by increases in stroke volumes. Elderly patients who are paced at a constant rate cannot use a target heart rate for monitoring the response to exercise activity. The rating of perceived exertion and blood pressure measurements should be checked frequently to ensure the adequacy and safety of exercise activity and to prevent untoward hemodynamic events.

Elderly patients are now being referred for cardiac rehabilitation after having had an automatic implantable cardiodefibrillator (AICD) inserted. These patients can participate safely in cardiac rehabilitation programs and show improved functional capacity.[28] Target heart rates in patients who have had an AICD should not be established based on maximum heart rates achieved during a graded exercise test. The AICD has a preprogrammed heart rate cutoff point above which it will deliver a shock if it senses a wide QRS tachyarrhythmia. For this reason, it is important to assess the heart rate cutoff of the AICD and to use this information in prescribing a target heart rate. This cutoff heart rate should not be approached during exercise activity, particularly in the case of patients with ventricular conduction defects. In selected patients who have AICDs, the use of β-blockers may help limit the heart rate response during exercise to prevent the AICD from discharging. Monitoring of these patients during cardiac exercise is otherwise unchanged.

The use of telemetry ECG monitoring in the elderly cardiac population varies widely. Most cardiac rehabilitation programs use ECG monitoring only during the first two or three weeks of program participation after a myocardial infarction or cardiac operation.[29] Continuous ECG monitoring is otherwise reserved for "high-risk patients," including those patients having severely depressed left ventricular function, complex ventricular arrhythmias at rest, ventricular arrhythmias appearing or increasing with exercise, falls in systolic blood pressure with exercise, a history of sudden cardiac arrest, and coronary artery disease or pronounced exercise-induced ischemia. Unfortunately, there are no controlled studies comparing the safety of exercise in elderly patients who have undergone training with on-site medical supervision with and without continuous ECG monitoring. Some patients have difficulty self-monitoring their heart rate response during exercise activity. Many of these have been able to master the rate-perceived exertion rating. As the perceived exertion rating correlates well with both heart rate response and oxygen consumption, these patients can often do without continuous ECG telemetry.

Patients should record their resting heart rate and perceived exertion rating and have their blood pressure checked on entry to the exercise area, at the end of warm-up exercises, every 5 to 10 minutes during active participation in the exercise activity, and at the end of their cool-down exercises. Electrocardiograms should be taken whenever a patient experiences a change in regularity of heart rate or if any untoward cardiac signs or symptoms are noted. Baseline ECGs should also be taken at the start of the program and at monthly intervals thereafter. Elderly patients who have had recent changes in cardiac medication or dosages may also need continuous ECG monitoring until they have shown appropriate stability on their new medication regimen.

Poor compliance of elderly patients in participating in exercise activity was strongly correlated with a lack of adequate information.[30] Other factors associated with reduced compliance in the elderly included a lack of motivation, an extremely lowered exercise tolerance, socioeconomic problems, and associated diseases. Patient education offered concurrently with the exercise program appeared to have a synergistic effect with attendance at both educational and exercise portions of the program. For example, smoking cessation after myocardial infarction was significantly higher among patients participating concomitantly in an exercise training group as compared with a nontraining group of patients.[31] Patients who have psychological impairment and disability within three months after a myocardial problem have shown increased problems with passive hopelessness and resignation to a life of dependency and incapacity with as long as three years' follow-up.[32] Early intervention with education and support may be crucial to reducing disability among these elderly cardiac patients. Social and emotional function also substantially improves in patients participating in the educational portion of a cardiac rehabilitation program.[33] Older adults desire and are able to learn new activities. Educating elderly cardiac patients is worth the time and effort involved. Associated health problems and age-related deficits that adversely affect learning in these patients should be viewed as handicaps that can be overcome. Dietary instructions for weight loss, control of hyperlipidemia, control of sodium intake, and modifications for other specific diseases are important educational topics. Smoking cessation and stress management are other topics that should be covered in the educational portion of a cardiac rehabilitation program.[34]

Medicare currently reimburses cardiac rehabilitation, hence reimbursement is often less of a problem for older patients than for persons younger than 65. Medicare contracts with intermediaries vary state by state and regionally. Because of this, implementation of Medicare guidelines may vary from state to state, depending on the administrative policies established by the various intermediaries. Patients must have a "clear medical need" and be referred by a physician. Determining the medical need usually consists of documenting within the preceding 12 months a diagnosis of acute myocardial infarction, a coronary artery bypass procedure, or having stable angina pectoris.[35] Reimbursement is subject to program restrictions and limitations. In some areas these include such criteria as requiring that a physician be on the premises and available to administer medical care at all times that the facility is opened; having immediately available cardiopulmonary emergency diagnostic and life-saving equipment; conducting the cardiac rehabilitation program in an area of the facility that has been set aside for the exclusive use of the program while in session; having the cardiac rehabilitation programs staffed by personnel who are trained in both basic and advanced life support techniques; and having personnel who are specifically trained for exercise therapy for coronary artery disease.

Within the next decades, substantial changes are likely to occur in the provision of cardiac rehabilitation to older and younger patients. The typical 12-week program, developed primarily because Medicare and other guarantors have reimbursed courses in 12-week blocks of time, will likely be done away with. The stratification of patients according to risk has been stressed in several publications.[36-39] Low-risk cardiac patients may be allowed to participate in programs for only as short a time as two to three weeks before being weaned to a "maintenance" program. Intermediate-risk patients will probably be approved for programs of six to eight weeks' duration with an increased intensity of monitoring. High-risk cardiac patients may be approved for 12 to 36 or more weeks of participation, with much more intense monitoring, possibly including continuous ECG monitoring by telemetry. Reports from the American College of Physicians and the American College of Cardiology that recommend similar guidelines appear to have been accepted in principle by guarantors and are the basis of the current policy guidelines for some Blue Cross and Blue Shield districts.[40] The effect of these programmatic changes on elderly cardiac patients may be much greater than on younger cardiac patients, particularly as the educational components will be most adversely affected. The elderly, many of whom show a decreased rate of new learning and have increased difficulty mastering self-monitoring techniques and assimilating information from educational programs, will be at a distinct disadvantage. These difficulties, coupled with a lack of reimbursement for the educational component of cardiac rehabilitation programs, will intensify the difficulties associated with providing appropriate patient education to augment the benefits of the exercise activity portion of cardiac rehabilitation in elderly patients. Hence, providing an appropriate educational component for elderly cardiac patients and their families may be the greatest challenge physicians working with these patients face in the 1990s.

REFERENCES

1. Sugiura M, Hiraoka K, Ohkawa S, Shimoda H: A clinicopathological study of the heart diseases in the aged—The morphological classification of the 1,000 consecutive autopsy cases. Jpn Heart J 1975; 16:526-536
2. Burch GE: Fundamentals of clinical cardiology: Interesting aspects of geriatric cardiology. Am Heart J 1975; 89:99-114
3. Caird FJ, Ball JLC, Williams BO: The cardiovascular system, *In* Brocklehurst JC (Ed): Textbook of Geriatric Medicine and Gerontology, Ed. 3. New York, NY, Churchill Livingstone, 1985
4. American College of Sports Medicine: Guidelines for Exercise Testing and Prescription, 3rd Ed. Philadelphia, Pa, Lea & Febiger, 1986
5. Beard OW: Age-related physiological changes in the cardiovascular system, *In* Cape RDT, Coe RM, Rossman I (Eds): Fundamentals of Geriatric Medicine. New York, NY, Raven Press, 1983
6. Smith EL, Serfuss RC (Eds): Exercise and Aging: The Scientific Basis. Minneapolis, Minn, Enslow Publishers, 1981, pp 19-28
7. Adrian MJ: Flexibility in aging adults, *In* Smith EL, Serfuss RC (Eds): Exercise and Aging: The Scientific Basis. Minneapolis, Minn, Enslow Publishers, 1981, pp 45-57
8. Fitts RH: Aging in skeletal muscle, *In* Smith EL, Serfuss RC (Eds): Exercise and Aging: The Scientific Basis. Minneapolis, Minn, Enslow Publishers, 1981, pp 31-44
9. Marsiglio A, Holm K: Physical conditioning in the aging adult. Nurse Practitioner 1988; 13:33-41
10. Greenland P: Cardiac fitness and rehabilitation in the elderly. J Am Geriatr Soc 1982; 30:607-611
11. American Running and Fitness Association: Aging and exercise. J Geriatr Psychiatry Neurol 1988; 1:176-177
12. Williams MA, Esterbrooks DJ, Sketch MH: Guidelines for exercise therapy of the elderly after myocardial infarction. Eur Heart J 1984; 5 Suppl E:121-123
13. Sloane PD: How to maintain the health of the independent elderly. Geriatrics 1989; 39:93-104
14. Ward A, Malloy P, Rippe J: Exercise prescription guidelines for normal and cardiac populations. Cardiol Clin 1987; 5:197-210
15. Newman KP, Phillips JH: Graded exercise testing for the diagnosis of coronary artery disease in elderly patients. Southern Med J 1988; 84:430-432
16. Glover DR, Robinson CS, Murray RG: Diagnostic exercise testing in 104 patients over 65 years of age. Eur Heart J 1984; 5 Suppl E:59-61
17. Podczeck A, Frohner K, Föderler G, Meisl K, Unger G, Steinbach K: Exercise test in patients over 65 years of age after the first myocardial infarction. Eur Heart J 1984; 5 Suppl E:89-92
18. Callahan P, Froelicher VF: Exercise test for identification of the high risk patient. Chest 1987; 92:741-744
19. Sannamaki KI: Early post myocardial infarction exercise testing in subjects 70 years or more of age—Functional and prognostic evaluation. Eur Heart J 1984; 5 Suppl E:93-96
20. Pollock ML, Pells AE III: Exercise prescription for the cardiac patient: An update. Clin Sports Med 1984; 3:425-442
21. Wofel EE, Hossack KF: Guidelines for the exercise training of elderly healthy individuals and elderly patients with cardiac disease. J Cardiopulmon Rehabil 1989; 9:40-45
22. Todd IC, Ballantyne D: Editorial review—Cardiac adaptations of training: Relevance to angina pectoris. Int J Cardiol 1986; 10:91-97
23. Laslett L, Paumer L, Amsterdam EA: Exercise training in coronary artery disease. Cardiol Clin 1987; 5:211-221
24. Turi Z, Cohn PF: How medical therapy of angina pectoris differs in patients over 65. Geriatrics 1980; 35:26-34
25. Jordaens L, de Backer G, Clement DL: Physiologic pacing in the elderly—Effects on exercise capacity and exercise-induced arrhythmias. Jpn Heart J 1988; 29:35-44
26. Den Heijer P, Nagelkerke D, Perrins EJ, et al: Improved rate responsive algorithm in QT driven pacemakers—Evaluation of initial response to exercise. PACE 1989; 12:805-811
27. Cobler JL, Akiyama T, Murphy GW: Permanent pacemakers in centenarians. J Am Geriatr Soc 1989; 37:753-756
28. Menard-Rothe K, Callahan CM: Cardiac rehabilitation and the automatic implantable defibrillator patient: Is it appropriate? Cardiopulmon Rehabil 1986; 6:400-408
29. Cole HM (Ed): Diagnostic and Therapeutic Technology Assessment (DATTA): Coronary Rehabilitation Services. JAMA 1987; 258:1959-1961
30. Gori P, Pivotti F, Mase N, Zucconi V, Scardi S: Compliance with cardiac rehabilitation in the elderly. Eur Heart J 1984; 5 Suppl E:109-111
31. Taylor CB, Houston-Miller N, Haskell WL, Debusk RF: Smoking cessation after acute myocardial infarction: The effects of exercise training. Addict Behav 1988; 13:331-335

32. Pathy MS, Peach H: Disability among the elderly after myocardial infarction: A 3-year follow-up. J R Coll Physicians Lond 1980; 14:221-223

33. Packa DR, Branyon ME, Kinney MR, Khan SH, Kelley R, Miers LJ: Quality of life of elderly patients enrolled in cardiac rehabilitation. J Cardiovasc Nurs 1989; 3:33-42

34. Sivarajan ES, Newton KM, Almes MJ, Kempf TM, Mansfield LW, Bruce RA: Limited effects of outpatient teaching and counseling after myocardial infarction: A controlled study. Heart Lung 1983; 12:65-73

35. Medicare Report: Cardiac Rehabilitation Programs. Baltimore, Blue Cross/Blue Shield of Maryland, 1989, pp 1, 6, 7

36. Health and Public Policy Committee, American College of Physicians: Position Paper: Cardiac rehabilitation services. Ann Intern Med 1988; 109:671-673

37. Greenland P, Chu JS: Efficacy of cardiac rehabilitation services with emphasis on patients after myocardial infarction. Ann Intern Med 1988; 109:650-663

38. Parmley WW: President's Page: Position report on cardiac rehabilitation. J Am Coll Cardiol 1986; 7:451-453

39. Wenger NK: Rehabilitation of the coronary patient in 1989. Arch Intern Med 1989; 149:1504-1506

40. Smith LK: The realpolitik of rehabilitation. J Cardiopulmon Rehabil 1990; 10:307-311

MY LUCKY STROKE

It was snowing hard when I turned the corner
off the highway into Bear Canyon Road . . .
lit a fire in the old wood stove
made four trips
up and down the inside twisting stairs
to bring wood enough for a day and night . . .
made lunch

I felt my right foot dragging now and then
my right hand slow to move . . .
odd sensation in the middle of my head
like a loose connection
and a bulb blinking once in a while
I figured sleep would fix it
but in the morning, worse, much worse
I called my wife and grandson
to come and get me
and over the phone I sobbed
having to ask for help
my wife knew at once
what the trouble was
we're going to the hospital

"You'll have to stay over"
surprised me I felt good
but they have to do tests
and you've a slur in your speech . . .
wheeled me out and left me in the hall
for over an hour no bottle to pee in
unable to move . . . what they said
stay in the hospital to avoid any trauma
they never heard of humiliation . . .
on Thursday the young nurse
said here's the stuff wash yourself
my right hand couldn't reach my left armpit
I practiced that all day
and next day I could reach it
Dot left me her tiny squeeze flashlight
to practice gaining grip . . .
cards flowers friends
in four days I talked so much
most of my slur disappeared
my wife Dot brought me clothes and courage . . .

I could see in the mirror
my slack right cheek
and my eye unable to wink
I practiced almost every hour
raising my cheek muscles
and winking my eye at fate
and my lucky stroke at seventy-five
it was the winking taught me
no more alcohol or cigarettes
I couldn't straighten out
the first two fingers of my right hand
so I held them closed with my left
and made them work to straighten out . . .

II
Casa Colina, in the stroke unit

Dot kissed me goodbye
in a room with four we're caught in a common net
feel the bond and help each other get out . . .
group session discussions . . .
testing memory and meandering . . .
lunch and dinner in the dining room
get yourself there in your old wheelchair
no footrests for the weak leg learn to paddle walk
use your arms to turn the wheels
leg gets tired arm gets tired
you want to eat get your ass in there
that's me talking to myself

Dot came for dinner almost every day
brought bookkeeping from the store
a great big help to me
to know that I was needed . . .
a lot more could be done
to help the patients help themselves
be innovative with their wheelchairs . . .
sometimes I went begging
for someone to walk with me
I couldn't have a walker or walk alone
when therapists and aides were busy
Andrea would get away from head injury
and help or nephew Fred from publicity
would spare a few minutes

I wish I could remember her name
that aide was not pretty but vital
firm in friendship single mother of two
I have a dozen hugs saved up for her . . .
finally out of my wheelchair walking free
how to get in and out of the shower
how to make coffee fill out a form
what do you want to do when you get home
I want to walk to work and to write . . .
one comment I hear
you're completely recovered
no one ever completely recovers
but learns new ways and quite likely for the better
I had thought I could do anything and as much
as I wanted
it took a lucky stroke to tell me
it just ain't so.

CHARLES CHASE©
Claremont, California

Charles Chase is pictured on the cover of this special issue busily working at one of his hobbies after recovering from the illness he describes in this condensation of his poem, "My Lucky Stroke." He owns a folk music store in southern California.